M/2 first modules generating M/2 first laser beams, wherein each of said M/2 first laser beams has a corresponding single wavelength;

(M/2)-1 dichroic first filters, wherein each of said (M/2)-1 dichroic first filters transmits a corresponding one of said M/2 first laser beams and reflects all other of said M/2 first laser beams;

M/2 second modules generating M/2 second laser beams, wherein each of said M/2 second laser beams has a corresponding single wavelength;

(M/2)-1 dichroic second filters, wherein each of said (M/2)-1 dichroic second filters transmits a corresponding one of said M/2 second laser beams and reflects all other of said M/2 second laser beams;

a polarizer coupling first and second M/2 laser beams to thereby produce M polarization coupled laser beams; and

a fiber coupling device collecting said M polarization coupled laser beams to produce a respective one of said N output beams.

8. The diode laser system as set forth in claim 1, wherein said each of said M-2 dichroic filters band pass filters said corresponding one of said M laser beams and reflects all other of said M laser beams.

9. A diode laser system, comprising:

N laser head assemblies (LHAs) generating N output beams, wherein each of said N LHAs includes:

M first modules generating M first laser beams, wherein each of said M first laser beams has a different single wavelength;

M-1 first dichroic filters defining a first optical waveguide for directing all of said M first laser beams into a first optical path, wherein each of said M-1 first dichroic filters transmits a corresponding one of said M first laser beams and reflects all other said M first laser beams;

a fiber coupling device disposed adjacent to said first optical path collecting said M first laser beams to produce a respective one of said N output beams;

N optical fibers receiving respective ones of said N output beams and generating N received output beams; and

an optical assembly recollimating and focusing the N received output beams onto a single spot,

where N and M are both integers ≧2.

10. The diode laser system as set forth in claim 9, wherein said optical assembly comprises:

N collimating lenses for recollimating said N output beams; and

a single transform lens for focusing said recollimated N output beams onto said single spot.

11. The diode laser system as set forth in claim 10, wherein said single spot corresponds to one end of a laser amplifying medium.

12. The diode laser system as set forth in claim 9, wherein each of said LHAs further comprises:

M second modules generating M second laser beams, wherein each of said M second laser beams has a different single wavelength;

M-1 second dichroic filters defining a second optical waveguide for directing all of said M second laser beams into a second optical path, wherein each of said M-1 second dichroic filters transmits a corresponding one of said M second laser beams and reflects all other said M second laser beams;

a rotating element for rotating the polarizations of said M second laser beams; and

a polarizer disposed at the intersection of said first and second optical paths coupling said M first and M second laser beams into the second optical path to thereby produce 2M polarization coupled laser beams;

wherein said fiber coupling device collects said 2M polarization coupled laser beams to produce a respective one of said N output beams.

13. The diode laser system as set forth in claim 9, wherein said fiber coupling device comprises a transform lens receiving and coupling said M first laser beams to one of said N optical fibers to thereby produce a respective one of said N output beams.

14. A diode laser system, comprising:

means for generating N laser beams, wherein each of said N laser beams includes multiple wavelengths of light and wherein said generating means comprises:

M first means for generating M first laser beams, wherein each of said M first laser beams has a different single wavelength;

M-1 first filter means defining a first optical waveguide for directing all of said M first laser beams into a first optical path, wherein each of said M-1 first filter means transmits a corresponding one of said M first laser beams and reflects all other said M first laser beams;

fiber coupling means disposed adjacent to said first optical path for collecting said M first laser beams and for producing a respective one of said N output laser beams;

N optical fiber means receiving respective one of said N output laser beams for generating N received output beams; and

output means for recollimating and for focusing said N received output beams on a single spot,

where N and M are both integers ≧2.

15. The diode laser system as set forth in claim 14, wherein said output means comprises:

N collimating lenses for recollimating said N×M laser beams; and

a single transform lens focusing said recollimated N×M laser beams onto said single spot.

16. The diode laser system as set forth in claim 14, wherein said single spot corresponds to one end of a solid state laser.

17. The diode laser system as set forth in claim 14, wherein said single spot corresponds to one end of a rare-earth doped optical fiber.

18. The diode laser system as set forth in claim 14, wherein said single spot corresponds to one end of a dye laser.

19. The diode laser system as set forth in claim 14, wherein said generating means further comprises:

second means for generating M second laser beams, wherein each of said M second laser beams has a different single wavelength;

M-1 second filter means defining a second optical waveguide for directing all of said M second laser beams into a second optical path, wherein each of said M-1 second filter means transmits a corresponding one of said M second laser beams and reflects all other said M second laser beams;

rotating means for rotating the polarizations of said M second laser beams; and

polarization means disposed at the intersection of said first and second optical paths for coupling said M first

and M second laser beams into said second optical path to thereby produce 2M polarization coupled laser beams,

wherein said fiber coupling means collects said 2M polarization coupled laser beams to produce a respective one of said N laser beams.

20. The diode laser system as set forth in claim **19**, wherein said fiber coupling device comprises a transform lens for receiving and for coupling said 2M polarization coupled laser beams to one of said N optical fiber means to thereby produce a respective one of said N output beams.

21. A method for generating a high energy laser beam, comprising:

(a) generating P collimated laser beams having an Mth wavelength;

(b) repeating step (a) M times so as to produce M×P collimated laser beams having M different wavelengths;

(c) coupling said M×P collimated laser beams into an optical path;

(d) coupling said M×P collimated laser beams into an ith optical fiber to thereby produce a corresponding ith output laser beam, where i=1 to N;

(e) repeating steps (a) through (d) N times to thereby generate N output laser beams;

(f) recollimating said N output laser beams to produce N recollimated laser beams; and

(g) focusing said N recollimated laser beams onto a single spot,

where M, N and P are integers ≧2.

22. The method as set forth in claim 21, wherein step (c) comprises dichroically coupling said M×P collimated laser beams into said optical path.

23. The method as set forth in claim 21, wherein step (c) comprises dichroically and polarization coupling said M×P collimated laser beams into said optical path.

24. The method as set forth in claim 21, wherein step (c) comprises polarization coupling said M×P collimated laser beams into said optical path.

* * * * *

~~25. A diode laser system, comprising:~~
~~a laser head assembly generating an output beam, the laser head assembly including:~~
~~M modules which generate M laser beams, wherein each of said M laser beams has a different single wavelength; and~~
~~M-2 dichroic filters, wherein each of said M-2 dichroic filters transmits a corresponding one of said M laser beams and reflects all other of said M laser beams into a predetermined optical path to produce said output beam,~~
~~where M is an integer ≥2.~~

sub C1

~~26. A diode laser system, comprising:~~
~~a laser head assembly which generates an output beam, the laser head assembly including:~~
~~M modules which generate M laser beams, wherein each of said M laser beams occupies a different wavelength band;~~
~~M-R dichroic filters, wherein each of said M-R dichroic filters transmits at least a respective one of said M laser beams occupying a given wavelength band and reflects all other of said M laser beams not occupying the given wavelength band; and~~
~~an optical device which combines said M laser beams to thereby produce said output beam,~~
~~wherein:~~
~~M and R are positive integers; and~~
~~M is an integer ≥2.~~

27. The diode laser system as recited in claim 26, wherein the optical device comprises means for collecting said M laser beams to thereby produce said output beam.

28. The diode laser system as recited in claim 26, wherein the optical device comprises a fiber coupling device which collects said M laser beams to thereby produce said output beam.

29. The diode laser system as recited in claim 26, wherein the optical device comprises a polarization combiner which combines first selected ones of said M laser beams with second selected ones of said M laser beams to thereby produce said output beam.

30. The diode laser system as recited in claim 29, wherein the first selected ones of said M laser beams are equal in number to the second selected ones of said M laser beams.

31. A laser head assembly which generates an output beam including M laser beams, comprising:

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M modules generating M laser beams, wherein each of said M laser beams has a different single wavelength; and

M-2 dichroic filters, wherein each of said M-2 dichroic filters transmits a corresponding one of said M laser beams and reflects all other of said M laser beams;

wherein M is an integer ≥2.

32. The laser head assembly as recited in claim 31, further comprising a fiber coupling device collecting said M laser beams to produce an output beam;

A2 concl.

33. A method for generating a high energy laser beam, comprising:

(a) generating P collimated laser beams having an Mth wavelength;

(b) repeating step (a) M times so as to produce MxP collimated laser beams having M different wavelengths; and

(c) coupling said MxP collimated laser beams into an optical path to produce a high energy laser beam,

wherein M and P are integers ≥2.

34. The method as recited in claim 33, wherein the step (c) comprises dichroically coupling said MxP collimated laser beams into said optical path.

35. The method as recited in claim 33, wherein the step (c) comprises dichroically and polarization coupling said MxP collimated laser beams into said optical path.

36. A diode laser system, comprising:

laser head assembly (LHA) which generates an output beam, the LHA including:

M modules generating M laser beams, wherein each of said M laser beams has a different single wavelength;

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M-1 dichroic filters defining an optical waveguide for directing all of said M laser beams into the optical path, wherein each of said M-1 first dichroic filters transmits a corresponding one of said M laser beams and reflects all other said M laser beams; and

a fiber coupling device disposed adjacent to the optical path for collecting said M laser beams to thereby produce an output beam;

where M is an integer ≥ **2.**

37. A diode laser system, comprising:

laser head assembly (LHA) which generates an output beam, the LHA including:

M first modules generating M first laser beams, wherein each of said M first laser beams has a different single wavelength;

M-1 first dichroic filters defining a first optical waveguide for directing all of said M first laser beams into a first optical path, wherein each of said M-1 first dichroic filters transmits a corresponding one of said M first laser beams and reflects all other said M first laser beams;

M second modules generating M second laser beams, wherein each of said M second laser beams has a different single wavelength;

M-1 second dichroic filters defining a second optical waveguide for directing all of said M second laser beams into a second optical path, wherein each of said M-1 second dichroic filters transmits a corresponding one of said M second laser beams and reflects all other said M second laser beams;

a polarization combiner disposed at the intersection of said first and second optical paths

which coupling said M first and M second laser beams into the second optical path to thereby produce 2M polarization coupled laser beams; and

a fiber coupling device disposed adjacent to said first and second optical paths for coupling said 2M polarization coupled laser beams to thereby produce the output beam,

where M is an integer ≥ 2.

38. A laser head assembly (LHA) which generates an output beam, comprising:

M modules generating M laser beams, wherein each of said M laser beams has a different single wavelength;

M-**R** dichroic filters defining a first optical waveguide for directing all of said M laser beams into a first optical path, wherein each of said M-**R** dichroic filters transmits at least one of said M laser beams;

S second modules generating S laser beams, wherein each of said S laser beams has a different single wavelength;

S-**T** dichroic filters defining a second optical waveguide for directing all of said S laser beams into a second optical path, wherein each of said S-T dichroic filters transmits at least one of said S laser beams;

a polarization combiner disposed at the intersection of said first and second optical paths which couple said M and said S laser beams into a common optical path to thereby produce M + S polarization coupled laser beams; and

a fiber coupling device disposed adjacent to said first and second optical paths for coupling said M + S polarization coupled laser beams to thereby produce the output beam,

wherein:

M, R, S and T are positive integers; and

at least one of M and S is ≥ 2.

39. A diode laser system, comprising:

means for generating M laser beams, each of said M laser beams having a different wavelength;

M-R filter means defining a first optical waveguide for directing all of said M first laser beams into an optical path, wherein each of said M-**R** filter means transmits at least one of said M first laser beams; and

fiber coupling means disposed adjacent to said optical path for collecting said M laser beams to thereby produce an output laser beam,

wherein M and R are both positive integers, and

wherein M ≥ **2.**

40. A diode laser system, comprising:

first means for generating M first laser beams, wherein each of said M first laser beams has a different single wavelength;

M-1 first filter means defining a first optical waveguide for directing all of said M first laser beams into an optical path, wherein each of said M-**1** filter means transmits a corresponding one of said M first laser beams and reflects all other said M first laser beams;

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second means for generating M second laser beams, wherein each of said M second laser beams has a different single wavelength;

M-1 second filter means defining a second optical waveguide for directing all of said M second laser beams into a second optical path, wherein each of said M-1 second filter means transmits a corresponding one of said M second laser beams and reflects all other said M second laser beams;

polarization combining means disposed at the intersection of said first and second optical paths for coupling said M first and said M second laser beams into said second optical path to thereby produce 2M polarization coupled laser beams; and

fiber coupling means disposed adjacent to said second optical path for collecting said 2M polarization coupled laser beams to thereby produce an output laser beam,

wherein M is a integer ≥ 2.

41. A method for generating a high energy laser beam, comprising:

(a) generating P collimated laser beams having an Mth wavelength;

(b) repeating step (a) M times so as to produce $M \times P$ collimated laser beams having M different wavelengths;

(c) coupling said $M \times P$ collimated laser beams into an optical path; and

(d) coupling said $M \times P$ collimated laser beams into an ith optical fiber to thereby produce a corresponding ith output laser beam, where i=1 to N;

where M, N and P are positive integers and both M and $P \geq 2$.